

**Safety Evaluation by the DOE Regulatory Unit
Of Proposed Authorization Basis Amendment Request
ABAR-W375-00-00014
to the Initial Safety Analysis Report and
the Hazard Analysis Report**

1.0 Introduction

The River Protection Project Waste Treatment Plant (RPP-WTP) will treat and immobilize High-Level (radioactive) Waste (HLW) contained in underground tanks at the Hanford Site. Requirements for the treatment and immobilization facility are contained in the Contract.¹ The Contract requires the Contractor to maintain the authorization basis current with the design. The Authorization Basis (AB) includes significant and bounding hazards identified in the Hazards Analysis Report (HAR) and fundamental aspects of design in the Initial Safety Analysis Report (ISAR).

BNFL letter CCN 012864 dated April 23, 2000,² and BNFL letter CCN 013259, dated May 19, 2000,³ requested approval to update the HAR to include 10 new significant or bounding hazard evaluations. The letters also requested approval to change two fundamental aspects of design described in the ISAR.

2.0 Background

Those portions of the Part A HAR that constitute significant or bounding hazards or hazardous situations are considered to be part of the AB, in accordance with BNFL commitments in the Integrated Safety Management Plan (ISMP), Section 3.3.1.8. Similarly, ISMP Section 3.3.1.3 commits to consider those portions of the ISAR that relate to the fundamental aspect of design to be part of the AB.

The design of the plant has changed since the HAR and ISAR were submitted to the RU and new information regarding the hazards inherent in the design of the plant has become available.

The submittal by BNFL of this Authorization Basis Amendment Request (ABAR) seeks to list the new significant or bounding hazards in a proposed Appendix E to the HAR, and to identify and update the fundamental aspects of design in a proposed Appendix A to the ISAR.

3.0 Evaluation

¹ Contract No. DE-AC27-96RL13308, between DOE and BNFL Inc., dated August 24, 1998.

² Letter CCN 012864, from A. J. Dobson, BNFL, to D. C. Gibbs, RL, "Request to Amend Authorization Basis Regarding New or Changed Significant and Bounding Hazard Evaluations and Fundamental Aspects of Design," dated April 23, 2000.

³ Letter CCN: 013259, from A. J. Dobson, BNFL to D. C. Gibbs, DOE/RU, "Errata to ABAR-W375-00-0014, Part A HAR Significant and Bounding Hazard Evaluations and ISAR Fundamental Aspects of Design, Affecting the Hazard Analysis Report," May 19, 2000.

3.1 Applicable Requirements

As noted above, ISMP Section 3.3.1.3 states those portions of the ISAR that relate to fundamental aspects of design are considered to be part of the AB.

ISMP Section 3.3.1.8 states that only the parts of the Part A HAR that address significant or bounding hazard evaluations are considered part of the AB.

3.2 Authorization Basis Deviations

ISAR Fundamental Aspects of Design

The proposed ABAR updates the AB to be consistent with the planned design as of April 2000. The fundamental aspects of design have been changed by BNFL since January 1998, when the ISAR was initially prepared without updating the AB as required. This deficiency was the subject of Inspection Report 99-07 issued December 13, 1999. BNFL submitted this ABAR as part of a comprehensive correction plan dated April 14, 2000. Two changes to fundamental aspects of design are considered by BNFL to be reductions in commitment to the fundamental aspects of design described in the ISAR. Reductions in commitment require RU approval in accordance with the contractually required "Regulatory Unit Position on Contractor Initiated Changes to the Authorization Basis," RL/REG-97-13, Section 3.6. These changes are:

- a. Addition of approximately 1.5 million gallons capacity for receipt and storage of Low-Activity Waste (LAW) in the pretreatment facility instead of using the existing Double-Shell Tank (DST) 241-AP-106; and
- b. washing and storage of High-Level Waste (HLW) solids in the pretreatment facility instead of receiving washed HLW solids from the tank farm operating contractor.

Storage of LAW feed in the pretreatment facility shifts radioactive material from the existing DST farm to the pretreatment facility. Hazards from frequent waste transfers to the facility are modified by making less frequent larger volume transfers. Hazards associated with the storage of LAW in a one million gallon tank are transferred to the pretreatment facility where they may be controlled through the use of multiple smaller tanks and control features integrated with the facility. BNFL states no changes to the applicable codes or standards in the Safety Requirement Document (SRD) are required for this change. However, no analysis of specific hazards, codes, or standards was provided.

Washing and storage of HLW solids in the pretreatment facility shifts the risk for performing this operation from the site tank farm operating contractor to BNFL. Additionally, inventories of radioactive material are shifted from the DST farm to the pretreatment facility. BNFL states no changes to the applicable codes and standards in the SRD are required for this change. However, no analysis of specific hazards, codes, or standards was provided.

Another change in facility design identified in the ABAR as a change to a fundamental aspect of design in the ISAR is the separation of the one large processing facility into four facilities. During Part A the pretreatment, LAW vitrification, and HLW vitrification functions were

integrated into one structure. These have been separated into four including pretreatment, LAW pretreatment, LAW vitrification, and HLW vitrification. BNFL considers that this change to a fundamental aspect of design in the ISAR does not require RU approval because it does not result in a reduction in commitment. BNFL states the individual facilities provide the confinement necessary for the associated process hazards. However, no analysis of specific hazards, codes, or standards was provided. Hazards associated with waste transfers between the facilities must be analyzed prior to submittal of the updated HAR, to support the BNFL assertion in the ABAR.

The safety evaluation for an ABAR should provide reasonable assurance that the health and safety of the public and workers will not be adversely affected by the changes. None of the changes to fundamental aspects of design discussed above provided this rationale. As described in RL/REG-97-13, evaluations shall be documented in sufficient detail such that a knowledgeable individual reviewing the evaluation can identify the technical issues considered during the evaluation and the basis for the determinations.

HAR Significant or Bounding Hazards

The proposed ABAR identifies 10 new significant or bounding hazards. BNFL states these new significant or bounding hazards are the result of design changes and hazard evaluations conducted during ISM Cycles 1 and 2. The following table identifies the new significant or bounding hazard and Severity Level (SL) based on an unmitigated event to the public, facility worker, and co-located worker.

| Significant or Bounding Hazard | Public | Facility Worker | Co-Located Worker |
|---|---------------|------------------------|--------------------------|
| High air flow in pretreatment HLW feed receipt vessels | SL-3 | SL-1 | SL-1 |
| Hydrogen explosion in HLW pretreatment feed receipt vessels | SL-1 | SL-1 | SL-1 |
| Radioactive spill in C2 pump and valve gallery | SL-1 | SL-1 | SL-1 |
| Dropped load in C5 cell | SL-1 | SL-1 | SL-1 |
| Hydrogen explosion in HLW concentrate receipt tanks | SL-3 | SL-1 | SL-1 |
| Direct exposure from HLW canister | N/A | SL-1 | N/A |
| Cask drop onto waste drum | SL-4 | SL-1 | SL-2 |
| Toxic release from LAW melter offgas | (1) | (2) | (1) |
| Overfill/leak of LAW feed receipt vessels | (3) | (3) | (3) |
| Changes to major radioactive streams | (4) | (4) | (4) |

- (1) Below threshold for chemical hazard
- (2) Above threshold for chemical hazard
- (3) Bounded by HLW feed receipt vessel hazards
- (4) Changes to capacities and inventories from Part A result in more severe hazards for some components

BNFL defines severity levels based on the consequences of an unmitigated event in Appendix A of the SRD as follows:

| SL | Facility Worker Consequence | Co-Located Worker Consequence | Public Consequence |
|------|-----------------------------|-------------------------------|--------------------|
| SL-1 | > 25 rem/event | > 25 rem/event | > 5 rem/event |
| SL-2 | 5 – 25 rem/event | 5 – 25 rem/event | 1 – 5 rem/event |
| SL-3 | 1 – 5 rem/event | 1 – 5 rem/event | 0/1 – 1 rem/event |
| SL-4 | < 1 rem/event | < 1 rem/event | < 0.1 rem/event |

The Part A HAR does not explicitly identify hazards that are significant or bounding. In a meeting between RU and BNFL personnel on June 12, 2000, the process for developing these new significant or bounding hazards was discussed. BNFL representatives stated that a comprehensive list of significant or bounding hazards has not been developed. The selection of new significant or bounding hazards was based on new or increased hazards identified in the ISM Cycle 1 and 2 process with expert judgment that these were significant. Based on differences in methodologies used to prepare the Part A HAR and the ISM Cycle 1 and 2 process a direct comparison of hazards and their consequences is not possible. Specifically, the Part A HAR considered mitigation in the assessment of consequences for many hazards while the ISM Cycle 1 and 2 process considered unmitigated hazards and used the SRD Appendix A and B methodology for hazard classification. This methodology was developed subsequent to the Part A HAR as part of the AB.

The RU considers the identification of the new significant or bounding hazards to be an enhancement to the AB.

4.0 Conclusion

The ABAR identifies changes to fundamental aspects of design in the ISAR and new significant or bounding hazards based on design changes and the ISM Cycle 1 and 2 process.

The addition of the fundamental aspects of design changes (proposed Appendix A) to the ISAR is disapproved. BNFL should promptly provide a safety evaluation of these changes to the RU in order to permit the completion of this review.

The addition of new significant or bounding hazards to the HAR (proposed Appendix E) is approved. The new significant or bounding hazards proposed for inclusion in the HAR are an enhancement to the AB.

On the basis of the consideration described above, the RU has concluded that there is reasonable assurance that the health and safety of the public and the workers will not be adversely affected by the portion of the proposed amendment that is approved providing a new Appendix E to the HAR. This portion of the proposed amendment complies with applicable laws, regulations, and requirements, and it is in conformance with DOE-stipulated safety standards and principles. Accordingly, this review concludes that this portion of the proposed amendment would not adversely affect the objectives of the RPP-WTP AB in terms of the criteria delineated above.

5.0 References

Hazard Analysis Report, BNFL-5193-HAR-01, Rev. 0, BNFL Inc., Richland, Washington, 1997.

Initial Safety Analysis Report, BNFL-5193-ISA-01, Rev. 0, BNFL Inc., Richland, Washington, 1998.

RL/REG-97-13, Rev. 6, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*, April 11, 2000.

Safety Requirements Document, BNFL-5193-SRD-01, Rev. 2, BNFL Inc., Richland, Washington, 1998.

TWRS-P Integrated Safety Management Plan, BNFL-5193-ISP-01, Rev. 4b, BNFL Inc., Richland, Washington, 1999.